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Abstract: Cognitive radio (CR) networks have been proposed as a solution to both spectrum inefficiency and spectrum scarcity problems. However, they face several challenges based on the fluctuating nature of the available spectrum, making it more difficult to support seamless communications, especially in CR cellular networks. In this paper, a spectrum-aware mobility management scheme is proposed for CR cellular networks. First, a novel network architecture is introduced to mitigate heterogeneous spectrum... **View more**

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Abstract:

Cognitive radio (CR) networks have been proposed as a solution to both spectrum inefficiency and spectrum scarcity problems. However, they face several challenges based on the fluctuating nature of the available spectrum, making it more difficult to support seamless communications, especially in CR cellular networks. In this paper, a spectrum-aware mobility management scheme is proposed for CR cellular networks. First, a novel network architecture is introduced to mitigate heterogeneous spectrum availability. Based on this architecture, a unified mobility management framework is developed to support diverse mobility events in CR networks, which consists of spectrum mobility management, user mobility management, and intercell resource allocation. The spectrum mobility management scheme determines a target cell and spectrum band for CR users adaptively dependent on time-varying spectrum opportunities, leading to increase in cell capacity. In the user mobility management scheme, a mobile user selects a proper handoff mechanism so as to minimize a switching latency at the cell boundary by considering spatially heterogeneous spectrum availability. Intercell resource allocation helps to improve the performance of both mobility management schemes by efficiently sharing spectrum resources with multiple cells. Simulation results show that the proposed method can achieve better performance than conventional handoff schemes in terms of both cell capacity as well as mobility support in communications.

Published in: IEEE Transactions on Mobile Computing (Volume: 11, Issue: 4, April 2012)

Page(s): 529 - 542

Date of Publication: 05 April 2011

ISSN Information:

INSPEC Accession Number: 12556318

DOI: 10.1109/TMC.2011.69

Publisher: IEEE

Sponsored by: IEEE Computer Society

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